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IS 80 (1991): Tung Oil for Paints [CHD 20: Paints, Varnishes and Related Products]



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भारतीय मानक

रंग-रोगन के लिये टंग आयल — विशिष्ट

( दूसरा पुनरीक्षण )

*Indian Standard*

TUNG OIL FOR PAINTS — SPECIFICATION

( *Second Revision* )

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BUREAU OF INDIAN STANDARDS

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## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Raw Materials for Paint Industry Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1950, largely based on the interim co-ordinated draft produced with the assistance of the representatives of the manufacturers and of various departments and authorities of the Government of India by the Co-ordinating Subcommittee of the No. 5 Standing Committee on Specification for Paints and Allied Stores of the General Headquarters (now Army Headquarters). The standard was first revised in 1971 mainly to update the requirements to suit the material being produced and consumed at the time and also to align it with ISO/R277 'Raw Tung Oil', prepared by the International Organization for Standardization (ISO).

The 1971 version of the standard prescribed requirements for two types of the oil differing slightly in the requirements of relative density and refractive index. In this second revision, the requirements have been merged doing away with the differentiation of the oil into two types. Further the requirements pertaining to gel time, unsaponifiable matter, relative density, refractive index have been modified. Measurement of colour on Gardner scale, volatile matter, freedom from linseed and fish oil, iodine value by Wij's method and tung oil quality test have been added. The tung oil quality test has been added to detect adulteration of tung oil with less conjugated oils.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## TUNG OIL FOR PAINTS — SPECIFICATION

### ( Second Revision )

#### 1 SCOPE

This standard prescribes requirements and the methods of sampling and test for tung oil for paints derived from the seeds of *Aleurites Fordii*.

#### 2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	Title
74 : 1979	Method of sampling and tests for drying oils for paints (second revision)
354 (Part 1) : 1987	Method of sampling and tests for resins; Part 1 General test method
1070 : 1977	Water for general laboratory use (second revision)
4048 : 1966	Density composition table for aqueous solutions of sulphuric acid

#### 3 TERMINOLOGY

For the purpose of this standard, definitions given in 2 of IS 74 : 1979 shall apply.

#### 4 REQUIREMENTS

##### 4.1 Description

The material shall be derived substantially from tung seeds of the species *Aleurites Fordii*, obtained by expression or extraction and shall be free from admixture with other oils or fats.

4.2 The material shall also comply with the requirements given in Table 1. References to the relevant clauses of IS 74 : 1979 and IS 354 (Part 1) : 1987 are given in col 4 and 5 of the table respectively.

#### 5 PACKING AND MARKING

##### 5.1 Packing

The material shall be packed in suitable containers as agreed to between the supplier and the purchaser.

##### 5.2 Marking

Each container shall be marked with the following information:

- Name of the material,
- Indication of source of manufacture,
- Volume of the material,

Table 1 Requirements for Tung Oil for Paints  
( Clause 4.2 )

Sl No.	Characteristic	Requirement	Method of Test, Ref to		
			Clause No. in IS 74 : 1979	Clause No. in IS 354 (Part 1) : 1987	Annex of this Standard
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour	Not darker than a combination of 25 yellow units and 5 red units	—	6.1	—
	a) On bond scale 6.35 mm cell				
	b) On gardner scale, Max	8	—	6.2	—
ii)	Acid value, Max	5	9	—	—
iii)	Saponification value	189-195	10	—	—
iv)	Iodine value				
	a) Wijs method, Min	163.0	11.1	—	—
	b) Total, Woburn method, Min	220.0	11.2	—	—
v)	Unsaponifiable matter, Max	0.75	12	—	—
vi)	Insoluble bromide test	To pass	18	—	—
vii)	Relative density, at 25°C	0.933 0.938	—	—	—
viii)	Refractive index, at 25°C	1.516 1.520	—	—	—
ix)	Gel time in min, at 28±1°C, Max	12	16	—	—
x)	Volatile matter, percent by mass, Max	0.5	—	—	A
xi)	Tung oil quality test	To pass	—	—	B
xii)	Freedom from linseed and fish oil	To pass	25	—	—

- Year and month of manufacture, and
- Lot or batch number.

#### 6 SAMPLING

Representative samples shall be drawn as prescribed in 3 of IS 74 : 1979.

#### 7 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (see IS 1070 : 1977) shall be employed in tests.

NOTE — Pure chemicals shall mean chemicals which do not affect the results of analysis.

## ANNEX A

### [ Table 1, Sl No. ( x ) ]

#### DETERMINATION OF VOLATILE MATTER

##### A-1 PRINCIPLE

Spreading of a test portion over a loose wad of glass wool in a drying tube, maintained at the desired temperature in an air-bath. Removing the volatile matter by means of an upward stream of dry nitrogen or other inert gas, previously dried.

##### A-2 APPARATUS AND MATERIALS

**A-2.1 Drying Tube** (see Fig. 1) — loosely charged with the wad of glass wool.

**A-2.2 Gas-Drying Train** — containing anhydrous calcium chloride and sulphuric acid 96 percent (*m/m*), supported on pumice granules.

**A-2.3 Air-Bath** — capable of being maintained at about 50°C.

**A-2.4 Nitrogen**, or other suitable gas.

##### A-3 PREPARATION OF TEST SAMPLE

Mix the sample of oil thoroughly by shaking.

##### A-4 PROCEDURE

Place the drying tube (A-2.1), with its wad of glass wool previously moistened and air-dried,

in the air-bath (A-2.3) and maintain it at about 50°C. Pass the dried (A-2.2) inert gas (A-2.4) until the apparatus (as shown from successive weighings) is constant in mass. Replace the inert gas by dried air and close the delivery and exit tubes by rubber caps before weighing. Weigh, to the nearest 1 mg, about 3 g of the test sample (A-3) into the tube and distribute it evenly over the glass wool. Pass the dried inert gas through the tube until the mass, as shown from successive weighings, is constant. Replace, before weighing, all the inert gas in the tube with dried air and close the delivery and exit tubes by the same rubber caps. In most cases the removal of volatile matter will be found to be complete after about 1 h.

##### A-5 EXPRESSION OF RESULTS

Calculate the volatile matter content by the equation:

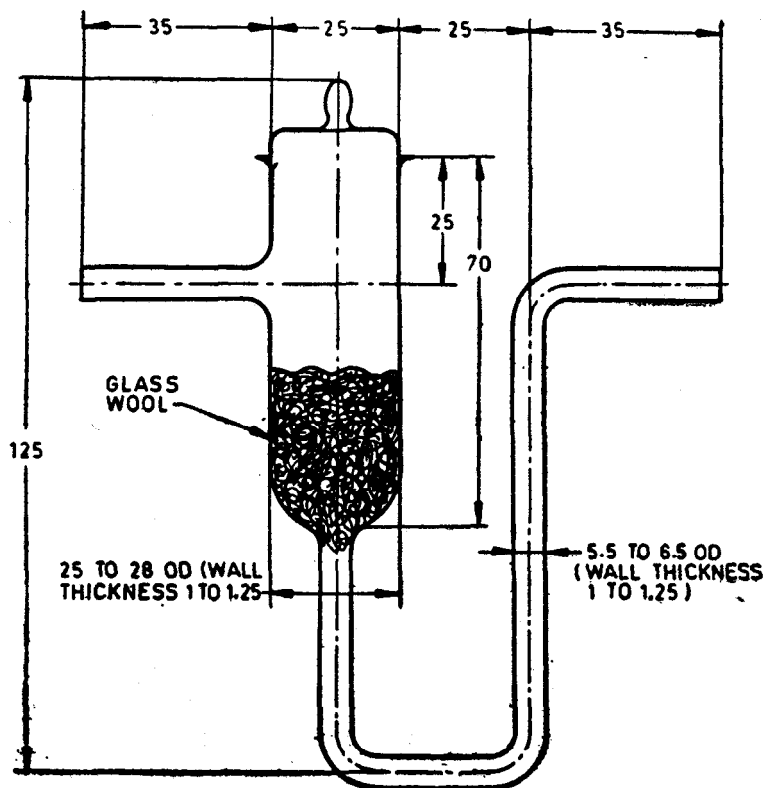
$$VM = \frac{m_0 - m_1}{m_0} \times 100$$

where

*VM* = volatile matter content, expressed as a percentage by mass;

*m*<sub>0</sub> = mass, in g, of the test portion; and

*m*<sub>1</sub> = mass, in g, of the residue.



Dimensions (approximate) in millimetres.

FIG. 1 DRYING TUBE

## ANNEX B

[ Table 1, *Sl No.* ( xi ) ]

## QUALITY TEST FOR TUNG OIL

## B-1 GENERAL

**B-1.1** This test method covers the determination of the quality of tung oil by distinguishing between pure and adulterated oil.

## B-2 PROCEDURE

**B-2.1** Weigh 150 g of the oil into an ordinary vitreous-enamelled iron pot and heat so that the temperature reaches  $282^{\circ}\text{C}$  in four minutes  $\pm 30$  seconds while stirring with a thermometer of range from  $-2^{\circ}\text{C}$  to  $300^{\circ}\text{C}$ . Turn down the flame and maintain the temperature at  $282 \pm 1^{\circ}\text{C}$ . Stir with the thermometer until, on lifting the thermometer, the oil drops with a pronounced string, showing that polymerization has started. The time required after reaching  $282 \pm 1^{\circ}\text{C}$  until the string is noted is the time

of the heat test. For pure tung oils this will not exceed 8 minutes.

**B-2.2** As soon as the oil strings, turn off the flame and remove the thermometer. Stir with a stiff spatula until the oil is solid. After stringing, a pure tung oil will require not over 40 seconds to become solid.

**B-2.3** When the oil has solidified, allow to stand exactly for one minute. Turn out upside down on clean paper and cut at once with a clean spatula. Pure tung oil gives a gel that is dry, not adhering to the spatula when cut. It is firm, crumbling under pressure of the spatula, without sticking. The crumbs should have an appearance like dry-bread crumbs. Adulterated tung oil gives a gel that is soft and sticky and does not crumble.



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